

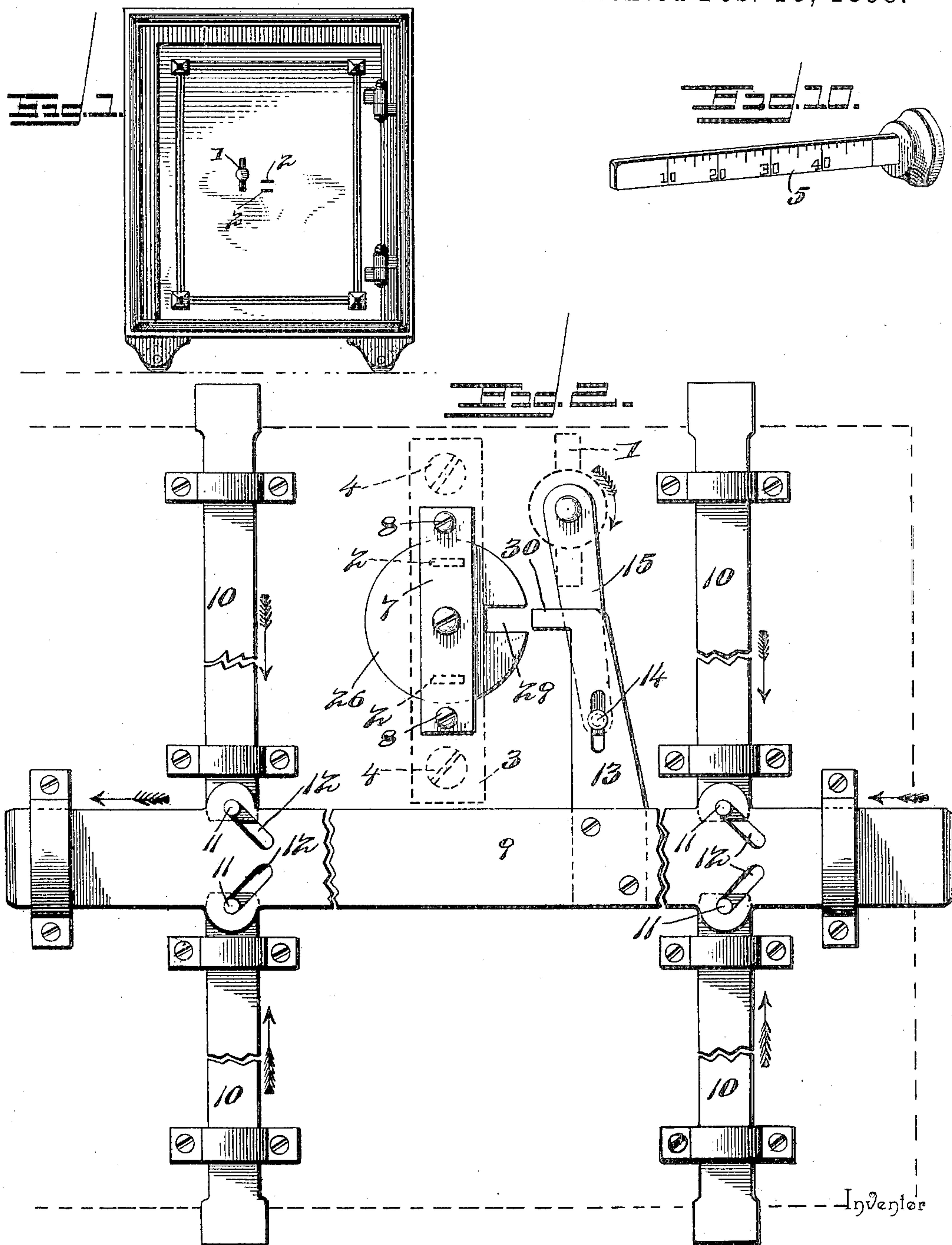
(No Model.)

2 Sheets—Sheet 1.

H. WISE.
LOCK.

No. 599,277.

Patented Feb. 15, 1898.



Inventor

Harry Wise

Witnesses

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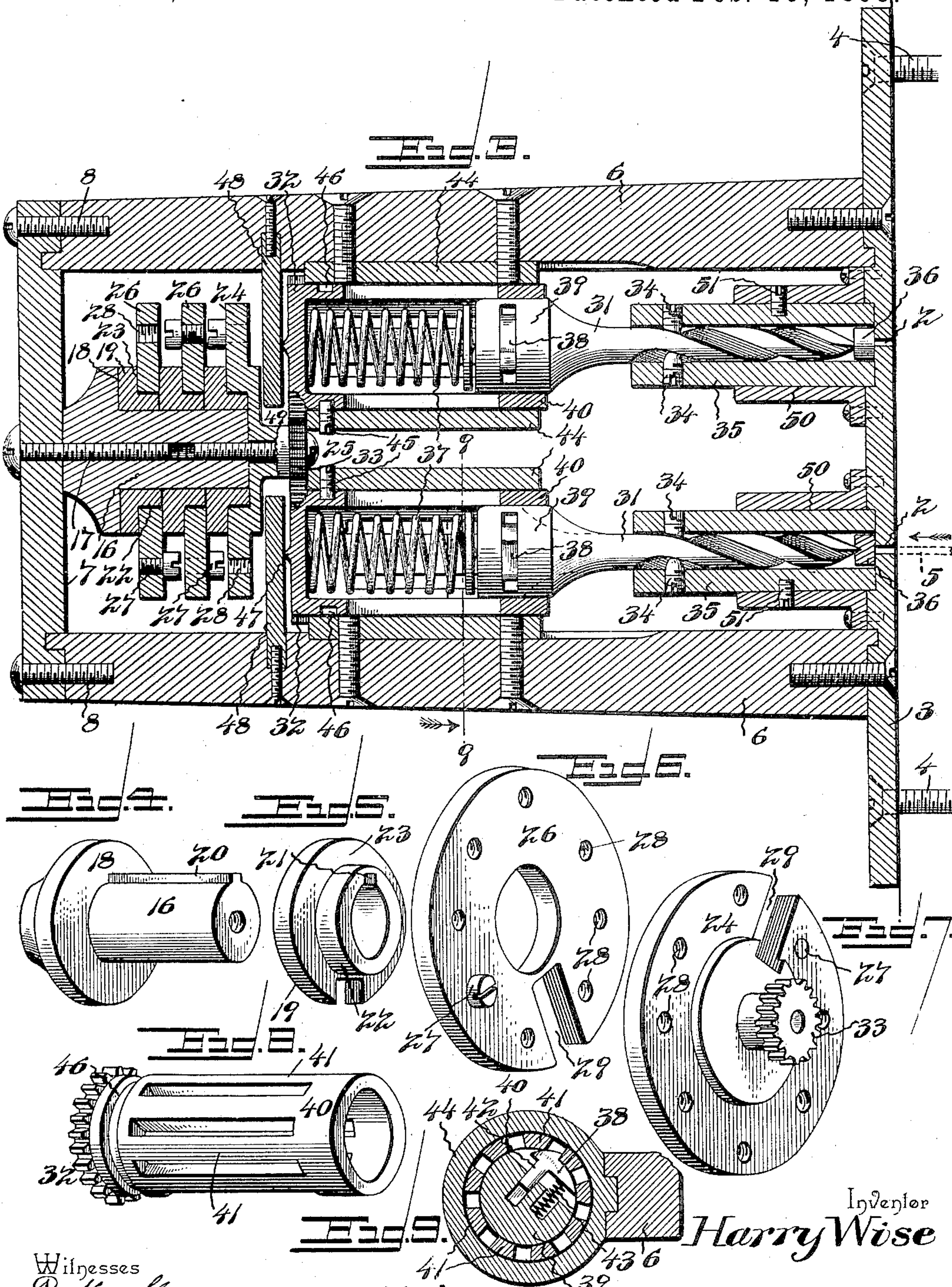
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Witnesses
C. E. Stewart
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By T. W. S. Attorneys

C. E. Stewart

UNITED STATES PATENT OFFICE.

HARRY WISE, OF SAN ANTONIO, TEXAS, ASSIGNOR OF ONE-HUNDRED-AND-NINETEEN ONE-HUNDRED-AND-SIXTIETHS TO WILLIAM DOBROWOLSKI, JOSIE WERNETTE, AND CHARLEY WERNETTE, OF SAME PLACE.

LOCK.

SPECIFICATION forming part of Letters Patent No. 599,277, dated February 15, 1898.

Application filed July 12, 1897. Serial No. 644,281. (No model.)

To all whom it may concern:

Be it known that I, HARRY WISE, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented a new and useful Safe-Lock, of which the following is a specification.

My invention relates to combination-locks, and particularly to locks designed for safes and similar receptacles; and the object in view is to provide a lock of the class named wherein the "life," or the controlling members, consisting of the tumblers, is protected and arranged out of the reach of agencies ordinarily employed for breaking safes; to provide a construction of lock wherein the combination-knob and similar exposed indicating devices are omitted; to provide a construction of tumblers and operating members wherein the factor of gravity is eliminated as an actuating force and wherein springs for insuring the coöperative relation of the controlling members are likewise dispensed with; to prevent the adjustment of the lock, without a knowledge of the combination, by means of sound, touch, or other sense, and, furthermore, to provide a lock of the class mentioned wherein the combination may be changed with facility.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a view of a safe fitted with a locking device constructed in accordance with my invention. Fig. 2 is an elevation of the locking-bolts and the controlling devices arranged in operative relation therewith as seen when viewed from the inner side of the door, the latter being indicated in dotted lines. Fig. 3 is a central longitudinal section of the lock proper. Fig. 4 is a detail view in perspective of the tumbler-journal. Fig. 5 is a similar view of one of the combined bearing-sleeves and spacing-rings. Fig. 6 is a similar view of one of the secondary tumbler-disks. Fig. 7 is a similar view of the primary tumbler-disk with the attached transmitting device. Fig. 8 is a similar view of one of the basket-ratchets.

Fig. 9 is a detail transverse sectional view, on the line 9 9 of Fig. 3, of one of the tumbler-disk-operating devices, including the basket-ratchet, plunger, and pawl, the latter being shown in engagement with the ratchet. Fig. 10 is a detail view of the key detached.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

In order to avoid the exposure on the face of the receptacle-door of indicating devices, such as a rotary combination-knob or the like, and limit the exposed devices to an operating-knob 1 and suitable key-slots 2, through which access may be had to the concealed operating members of the lock by means of the devices provided for that purpose, I employ a face-plate 3, adapted to be bolted or otherwise permanently secured, as shown at 4, to the door, said face-plate having formed therein said openings 2 for the reception of a key 5. (Shown in Fig. 10 and in dotted lines in Fig. 3.) The face-plate supports a frame consisting of side bars 6 and a removable connecting end bar 7, secured in place by means of screws 8 or their equivalents and adapted to be exposed at the inner side of the door to facilitate the change of the combination, as will be understood as the invention is more fully disclosed.

Any suitable construction of locking-bolts may be employed in connection with the lock embodying my invention; but in order to illustrate the application of the latter I have shown a system of bolts including a main horizontal operating-bolt 9 and a plurality of auxiliary vertical bolts 10, connected with the operating-bolt by pins 11 and inclined slots or cams 12, whereby as the main or operating bolt is moved in the direction indicated by the arrow contiguous thereto to withdraw its outer end from engagement with the frame of the safe the auxiliary bolts are likewise retracted in the direction indicated by the arrows contiguous thereto. The operating-bolt is provided with an extension 13, which has a sliding or equivalent connection (shown at 14) with an arm 15 on the operating-knob 1, the latter being exposed, as above described, at the face of the door.

In the construction of the improved lock I have found it desirable to employ rotary tumbler-disks mounted coaxially upon a horizontal axis, and hence in the construction illustrated an axially-bored tumbler-journal 16 is secured by means of a fastening device, such as a screw 17, to the center of the cross-bar 7 at the inner end of the lock-frame, said journal preferably having a rear enlargement or collar 18, and upon this journal are fitted bearing-sleeves 19, which are held from rotation by a key or feather 20 on the journal engaging suitable notches 21 in the sleeves. The construction of the sleeves is such that each forms a bearing 22 for a tumbler and an annular flange or spacing-ring 23 for interposition between contiguous tumblers. The main or primary tumbler 24 is fitted upon the front end of the journal, where it is secured in place by means of a retaining-screw 25, threaded into the bore of said tumbler-journal 16, and the auxiliary or secondary tumblers 26 are mounted successively in rear of the main or primary tumbler for actuation thereby, any desired number of auxiliary or secondary tumblers being employed.

The operating devices hereinafter described are designed to communicate rotary motion in either direction to the main or primary tumbler, and in order that motion may be communicated thereby to the remaining tumblers of the series each tumbler is provided upon one side with a stud or pin to engage a corresponding stud or pin on the contiguous or facing side of the adjacent tumbler, and in the construction illustrated these studs or pins 27 consist of screws threaded into openings 28 in the tumbler-disks, and it is obvious that by employing a plurality of threaded openings 28, into either of which the stud or pin may be fitted, the combination may be changed and the relative amounts of movement of the main or primary tumbler in opposite directions in order to secure the alinement of the peripheral seats or notches 29 may be avoided. These peripheral seats or notches, as will be understood, are designed for the reception of a tongue 30, carried by the operating-bolt and preferably formed on the extremity of the extension 13, the alinement of said seats or notches being necessary to allow of movement of the operating-bolt to withdraw the locking-bolts from their engaging positions.

In order to secure the alinement of the seats or notches 29 of the tumblers, it is necessary, as in other locks of this class, to turn the main or primary tumbler in one direction until all of the tumblers have been assembled and until the terminal tumbler, or that which is most remote from the primary tumbler, is in the proper position, after which a reverse rotation of the terminal tumbler must be instituted in order to assemble all of the tumblers, with the exception of said terminal tumbler, and cause rotation thereof in the opposite direction, whereupon the tumbler next

to said terminal tumbler may be arranged with its seat or notch 29 in alinement with the tongue 30, and thus the main or primary tumbler must be rotated alternately in opposite directions, each time assembling one less tumbler, until all have been adjusted. In order to secure this rotation alternately in opposite directions of the primary tumbler without enabling the operator to know the point at which the stud or pin of one tumbler engages the stud or pin of the next tumbler, and otherwise to prevent the operator from detecting either by sound or touch the relative operations of the tumblers, I have provided a mechanism adapted to be actuated by a push key or pin, which may, as illustrated in the drawings, be detachable for insertion through an opening, such as a keyhole 2, in the face of the lock. In the path of the push key or pin I preferably arrange a plunger 31, adapted to communicate rotary motion in one direction only to a revoluble member 32, from which motion is communicated, through a transmitting device 33, to the primary tumbler-disk. By duplicating the revoluble member 32 and arranging these members so as to communicate motion to the transmitting device 33 in opposite directions, and also duplicating the plunger 31, it is obvious that by operating the plungers alternately rotary motion in opposite directions may be alternately communicated to the primary tumbler. In the construction illustrated the revoluble members 32 consist of gears and the transmitting device 33 of a pinion which is fixed to the primary tumbler-disk, said gears being arranged upon opposite sides of the pinion and having actuating devices, including the plungers 31, whereby each may be turned in only one direction and whereby they are capable of relative movement in opposite directions.

Various means may be employed for communicating rotary motion to the revoluble members 32 from the reciprocatory members 31, adapted to be actuated by the push key or pin; but that construction which I have found preferable and as least liable to indicate to the operator the relative positions of the parts is illustrated in the drawings, wherein the stems of the plungers are spirally grooved and are engaged by fixed keys or feathers 34, consisting in the present instance of opposite set-screws supported by tubular guides 35, mounted on the frame of the lock. The plunger-stems are provided at their front ends with center-points, against which bear followers 36, fitted snugly in the guides 35 and adapted to receive the pressure of the push key or pin. It is obvious that as the followers are successively moved inwardly by the pressure of the push key or pin the fixed keys or feathers 34 cause the plungers 31 to rotate, and thus communicate rotary motion to the revoluble members 32. In order, however, to allow each plunger to return to its normal position under the constant ten-

sion of the cooperating return-spring 37, it is necessary to employ a clutch or ratchet connection between said plunger and the revoluble member 32, and that connection which I have found most desirable under varying conditions of use is illustrated in the drawings, wherein the plunger is provided with a spring-actuated pawl 38, arranged in a recessed head or enlargement 39, which fits to slide in a tubular or basket ratchet-wheel 40, fixed to the contiguous revoluble member 32. Said basket ratchet-wheel is provided with longitudinal spaced bars 41, forming teeth for engagement by the pawl without interfering with the reciprocatory movement of the plunger; and the pawls carried, respectively, by the plungers are arranged in relatively opposite positions, and in the construction illustrated each pawl is provided with a guide-pin 42 and an actuating-spring 43. The tumbler ratchet-wheels are preferably mounted in cylindrical bearings 44, provided with guide-screws 45, engaging annular grooves 46, and the revoluble members 32 are preferably provided with center-points 47, which bear against a transverse partition 48, arranged between the side bars 6 of the lock-frame, an opening 49 being formed in the center of said partition to allow the transmitting device 33 to project through into engagement with the revoluble members 32, while the tumbler mechanism is arranged in rear of the partition and is protected thereby from tampering by tools introduced through the front of the lock. The guide-tubes 35, in which the plunger-stems operate, are fitted in cylindrical seats 50 and are held from displacement by means of set-screws 51.

From the above description it will be seen that the only openings through which access may be had to the interior of the lock are the keyholes 2, which communicate only with the extended guide-tubes 35, closed by the plunger-stems, which fit snugly therein, and also closed by the followers 36. Hence the insertion of a tool, as a wire or its equivalent, is prevented, and even if a device of the class named were to be introduced through one of the key-openings it could only be brought into contact with the enlargement or head of the plunger. It could not be introduced into the space in rear of the partition 48 and thereby brought into contact with the tumblers. Hence the "life" of the lock, or that portion of its construction which controls the operation of the locking-bolts, is inaccessible. Furthermore, in operating the lock the push key or pin 5 is introduced, and by it reciprocatory movement is imparted to the plungers alternately; but as the extent of rotation of a plunger is due to the pitch of the threads in the feed-screws and as under ordinary circumstances it is expedient to employ a plunger of which the throw is insufficient to cause the maximum rotation of the primary tumbler it is obvious that a plurality of successive movements of a plunger is necessary in order to assemble the tumblers and dispose them to

adjust the terminal tumbler, as hereinbefore explained. Furthermore, as the adjustment of the successive tumbler-disks proceeds the extent of movement of the plungers necessary to accomplish the desired result becomes less, and therefore it is necessary to provide means whereby the extent of insertion of the push key or pin may be measured. To accomplish this, I preferably employ a graduated key, as shown, having a scale which by comparison with the face of the lock shows the amount of movement which has been communicated to the plunger. This graduated key forms the indicator by which the lock, set to any desired combination, may be manipulated.

It will be understood, furthermore, that while in the construction illustrated I have shown yielding means for returning the plunger after release by the push-key I do not wish to be limited to this precise arrangement, for the reason that the essential feature of the tumbler-operating devices is that the rotary adjustment of the tumbler-disks is accomplished by the alternate reciprocation of plungers or their equivalents, each of which is adapted to impart rotary motion in one direction only to the tumbler-disks and each of which is operative during its motion in only one direction, whether it receives its operative motion by means of a push-key or the return-spring, it being obvious that the pawls may be disposed to communicate rotary motion to the baskets during the return movement of the plungers instead of during the initial movement under the influence of the push-key. In either case the major portion of the resistance which is caused by the operation of the lock is due to the spiral motion of the plunger and the pressure of the spring, while the tumblers are mounted to turn with the minimum friction, and thus prevent the operator from ascertaining by touch when the tumbler-disks are successively taken up in the assembling operation.

It is obvious, furthermore, that various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. A combination-lock having rotary tumblers, a reciprocatory member capable of movement through a path varying in length, connections between the reciprocatory member and the tumblers, whereby the latter are moved proportionately in extent to the former, when the reciprocatory member is moved in one direction, and exposed graduated means for determining the desired extent of movement of the reciprocatory member, substantially as specified.

2. A combination-lock having rotary tumblers, a reciprocatory member, connections between the reciprocatory member and the tumblers, whereby the latter are actuated

only when the former is moved in one direction, and a detachable push key or pin, substantially as specified.

3. A combination-lock having rotary tumblers, a reciprocatory member, connections between the reciprocatory member and the tumblers, and a graduated push-key for actuating the reciprocatory member, substantially as specified.

4. A combination-lock having primary and secondary rotary tumblers, a plurality of reciprocatory members, and means for communicating rotary motion in opposite directions, respectively, from the reciprocatory members to the primary tumbler, substantially as specified.

5. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, reciprocable plungers having clutch connections respectively with the said revoluble members, and means for communicating rotary motion to the plungers, substantially as specified.

6. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, plungers having actuating feed-screws, for communicating rotary motion thereto when reciprocated, and clutch connections between the plungers and the revoluble members, whereby each plunger operates the connected revoluble member when moving in one direction, only, substantially as specified.

7. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, plungers having clutch connections respectively with said revoluble members, for communicating rotary motion thereto when the plungers move in one direction, the plungers having stems constructed to form feed-screws, fixed keys or pins engaging the feed-screws, and followers mounted in guides for movement parallel with the axes of the plungers and adapted to receive the pressure of push-keys, substantially as specified.

8. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, reciprocable plungers having clutch connections respectively with said revoluble members to communicate rotary motion in one direction thereto, said plungers having stems constructed to form feed-screws, fixed guides for the plunger-stems carrying feathers or pins to engage the feed-screws, and followers mounted in the guides to communicate axial pressure to the plunger-stems and adapted to receive the pressure of push-keys, substantially as specified.

9. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, reciprocable plungers having clutch connections respectively with said revoluble

members to communicate motion in one direction thereto, and provided with means whereby they are yieldingly held in their normal positions, plunger-stem guides in communication with key-openings in the face of the lock-frame and having the plunger-stems fitted snugly therein and adapted to receive the pressure of push-keys inserted through said openings, and means for communicating rotary motion to the plungers when actuated axially, substantially as specified.

10. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, cylindrical seats supported by the lock-frame, guide-tubes removably fitted in said seats in communication with key-openings in the face of the lock-casing, means for securing the guide-tubes in their seats, plunger-stems fitting snugly in the guide-tubes and adapted to receive the pressure of push-keys inserted through said key-openings, and means for imparting rotary motion to the plunger when actuated axially, substantially as specified.

11. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, elongated cylindrical basket ratchet-wheels connected with said revoluble members, plungers fitted for reciprocation in said basket ratchet-wheels, and provided with pawls to engage elongated teeth on said wheels, the plungers being yieldingly held in their normal positions and being adapted to receive axial pressure to advance them in opposition to their yielding resistance, and means for communicating rotary motion to the plungers when advanced axially, substantially as specified.

12. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, elongated cylindrical basket ratchet-wheels connected with said revoluble members, plungers fitted for reciprocation in said basket ratchet-wheels, springs incased within the basket ratchet-wheels to yieldingly hold the plungers in their normal positions, said plungers being adapted to receive axial pressure in opposition to the resistance of said springs, and means for communicating rotary motion to the plungers when advanced axially, substantially as specified.

13. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler, elongated cylindrical basket ratchet-wheels connected respectively to said revoluble members, cylindrical bearings for the said ratchet-wheels, means for preventing axial displacement of said ratchet-wheels, plungers mounted for reciprocation in the ratchet-wheels and provided with pawls for engaging the elongated teeth thereof, springs for yieldingly holding the plungers in their normal positions, said plungers being adapted

to receive axial pressure to advance them in opposition to said yielding pressure, and means for communicating rotary motion to the plungers when advanced axially, substantially as specified.

14. A combination-lock having primary and secondary rotary tumblers, oppositely-revoluble members connected with the primary tumbler and carrying cylindrical basket ratchet-wheels, a stationary wall adapted to receive the axial thrust of said revoluble members, spring-actuated plungers fitted for reciprocation in said basket ratchet-wheels and carrying pawls to engage the elongated teeth thereof, said plungers being adapted to receive axial pressure to advance them in opposition to the pressure of their springs, and means for communicating rotary motion to the plungers when advanced axially, substantially as specified.

15. A combination-lock having a frame pro-

vided with a face-plate having key-openings, and a transverse partition arranged parallel with and in rear of the face-plate, primary and secondary rotary tumblers mounted coaxially in rear of said partition, the primary tumbler carrying a pinion disposed in front of the plane of the partition, cylindrical ratchet-wheels having gears meshing with said pinion, reciprocable plungers having pawls for engaging the ratchet-wheels, to communicate rotary motion in opposite directions thereto, and means for rotating the plungers when moved axially, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARRY WISE.

Witnesses:

GEO. G. LESTER,
H. FEILLE.